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Title:

Training physiotherapists to use the Pelvic Organ Prolapse Quantification (POP-Q) system

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Abstract (250 words)

Introduction and Hypothesis The Pelvic Organ Prolapse Quantification system (POP-Q) is an outcome measure used mainly by gynaecologists which has no standardised training package. We hypothesised that a training package consisting of a formal training session and clinical training sessions would allow physiotherapists to be trained to independently perform the POP-Q.

Methods A training package was designed to train physiotherapists to use the POP-Q system as part of another study. Progress through the training, and instances of additional training were observed. A focus group was conducted to explore the training from the point of view of the physiotherapists, and descriptive themes were reported.

Results: Six physiotherapists with a range of experience in women's health, attended a formal training session and three or four supervised clinical training sessions. Instances of informal discussion with colleagues, repeated viewing of the American Urogynecological Society POP-Q training DVD, and self-development of 3-d models to demonstrate the POP-Q system were observed. The focus group indicated that the physiotherapists had gained a good conceptual understanding of the POP-Q, but were not always confident when performing the examination. Physiotherapists would have appreciated additional clinical training and the opportunity for discussion with experienced colleagues.

Conclusions: A training package consisting of a formal training session and clinical training sessions, assisted by self-development of 3-d models, was successful in training six physiotherapists to use the POP-Q with a good level of conceptual understanding. Confidence in performing the POP-Q was restricted by the limited opportunities for clinical practice and discussion with colleagues.

Keywords

physiotherapists; POP-Q; training; pelvic organ prolapse

Introduction

The pelvic organ prolapse quantification system (POP-Q, Bump *et al.* 1996) is a standardised outcome measuring pelvic organ prolapse (POP) used primarily by gynaecologists. Physiotherapists routinely deliver pelvic floor muscle training to treat women with POP (Hagen *et al.* 2016), however no common outcome is used for assessment, and the POP-Q is not routinely taught to physiotherapists. The POP-Q examination measures nine site-specific points [six internal vaginal (Aa, Ap, Ba, Bp, C, D) and three external (gh, pb, TVL) measures], tracing the anterior, apical, and posterior profile of the POP, and provides rules to calculate a categorical prolapse stage [range 0 to IV].

Whilst being a recommended, standardised tool, the POP-Q is under-used in clinical practice amongst gynaecologists; it is perceived as being time-consuming and difficult to understand (Auwad *et al.* 2004, Scotti *et al.* 2000). Training is likely to be a key component in allowing this outcome measure to become accepted and used by gynaecologists and other clinicians. There is no standardised and accepted method of training individuals to use the POP-Q. Reading the original article which described the POP-Q (Bump *et al.* 1996) is regarded as a poor starting point for teaching the POP-Q. The language of the article has been criticised for being impenetrable (Scotti *et al.* 2000), whilst reading the article did not affect final comprehension of POP-Q by medical students (Steele *et al.* 1998).

The three articles that report on teaching the POP-Q system, all concur that the POP-Q needs to be adequately conceptualised by the trainee, suggesting different non-verbal, non-written methods to enable that conceptualisation: a diagram (Scotti *et al.* 2000), a video (Steele *et al.* 1998), and a three-dimensional model (Geiss *et al.* 2007). A revised conceptual system to visualise the vagina and surrounding support

structures, presented as a diagram, removes the need to use the letters of the POP-Q system (Scotti *et al.* 2000). Use of this analogy has been informally reported to have received positive feedback from those to whom it has been presented (Flora 2014). Fifty-four medical students were trained in three stages (Steele *et al.* 1998): reading the original article; observing the POP-Q training DVD (from the American Urogynecological Society (AUGS)); and using a brief visual memory aid. Assessed by a questionnaire testing understanding, the DVD was the most effective component of the training. The three-dimensional model (Geiss *et al.* 2007) was based on an inverted “Santa Claus cap”, with the tassel representing the cervix, and buttons sewn to the cap representing two site-specific points (Aa; Ap). The cap was fixed to a wooden embroidery frame, representing the hymen. The mean level of satisfaction of 82 participants with training workshops using this tool was 1.3 (1=very satisfactory, 5=not satisfactory).

Following adequate conceptualisation, the successful development of a practical skill requires physical practice. In a commentary on Steele *et al.* (1998), Wells stated that after a POP-Q training programme using the original article and video, mastery of the POP-Q was only achieved as it was performed in the clinical setting. Use of the original article, a training video, and question and answer session to train medical students, assessed by questionnaire, demonstrated improved understanding immediately, which was lower (but still improved from baseline) 5 months after training (Peterson & Amin 2014).

In preparation for a study to assess the reliability of physiotherapists using the POP-Q system, a training package was assembled, designed to guide the trainee examiners from first concepts through to clinical practice. The aim of this article is to describe that training package, and to report on its implementation and evaluation as

part of the reliability study. We hypothesised that a training package consisting of a formal training session including a non-verbal, non-written method of conceptualisation followed by clinical training sessions would allow physiotherapists to be trained to perform the POP-Q independently and with confidence.

Methods

The development, implementation and evaluation of the POP-Q training package took place within the context of a reliability study investigating the inter- and intra-rater reliability of the POP-Q (Stark *et al.* 2010). Two gynaecologists, experienced in performing POP-Q, acted as a gold standard, while six physiotherapists participated as POP-Q examiners and were trained in its use. Women, who would have had a vaginal examination as part of their routine care, were recruited from urogynaecology and gynaecology outpatient clinics in two Glasgow hospitals. Four POP-Q examinations were performed on each participant during two clinical visits, by three different POP-Q examiners. The study was approved by the South Glasgow Research Ethics Committee on 1st March 2006 (REC reference number 06/S0702/9).

The POP-Q training package

The training programme, based on available literature, was designed and implemented in 2006. It consisted of a formal training session to allow conceptualisation of the POP-Q followed by a period of practical training.

Formal training session

The formal training session, led by a subspecialist registrar in urogynaecology, was 1.5 hours in duration, covering:

- 1) a verbal explanation of POP-Q system, augmented by a diagram from the original article (Bump *et al.* 1996) showing a side-profile view of the vagina, and the nine site-specific measurement points;
- 2) observation of the AUGS POP-Q training DVD;
- 3) information on standardising conditions for the reliability study, including examination protocols, equipment, and data collection (a recording chart was developed for the study, recording the POP-Q points in the order measured and with space to draw the vaginal profile, figure 1);
- 4) a question and answer session, led by the subspecialist registrar, and;
- 5) a second viewing of the AUGS POP-Q training DVD.

Place Figure 1 here

Information regarding the use of 3-d models (Geiss *et al.* 2007) was not available at the time of the design and implementation of the training, and the AUGS POP-Q DVD was selected as a commercially available method of conceptualisation for teaching the POP-Q. Although the physiotherapist examiners were provided with the original POP-Q article before the training session, they were not otherwise encouraged to read it before attending. The additional explanation and discussion during the training session served to cement the conceptualisation of the POP-Q and to provide standardised practice for the reliability study.

Practical training

The practical training consisted of physiotherapists observing experienced gynaecologists performing POP-Q examinations at outpatient clinics, followed by

physiotherapists performing POP-Q examinations supervised by clinic medical staff. The practical training sessions took place in the clinics used in the reliability study, which were not dedicated POP clinics, and thus not all participants in the study had clinically relevant prolapse

Implementation and Continued Development of the Training Package

Attendance at the training sessions, and the number of cases observed and performed by the physiotherapist examiners during the reliability study were recorded. The principal investigator of the reliability study, a physiotherapist, attended all study clinics and observed ongoing development of skills and understanding of the POP-Q by the physiotherapist examiners.

Evaluation and feedback

Six months after the training programme the POP-Q examiners were invited to attend a focus group feedback session. Moderated by two researchers, the focus group was semi-structured, allowing the group to discuss various aspects of the study. The focus group was recorded using a digital voice recorder and was transcribed. Emerging themes relating to training and implementation of the POP-Q were developed from repeated reading of the transcript and a basic descriptive analysis was conducted.

Results

Implementation of the Training Package

Six physiotherapists and two gynaecologists participated in the reliability study (Table 1). Each physiotherapist attended the formal training session and three or four clinics for the practical training. Once each physiotherapist felt able, they performed POP-Q

examinations with supervision and feedback from the experienced medical staff at the clinic. In addition, as they were initially unfamiliar with vaginal examination, staff grade physiotherapists (4 months experience) also observed a number of vaginal examinations by gynaecologists and physiotherapists performing pelvic floor muscle assessments prior to commencing their practical training for the POP-Q.

Place Table 1 here

Continued Development of Training

Further self-learning was optional, however most of the physiotherapists followed some form of continued training whilst using the POP-Q during the reliability study. Four of the physiotherapist examiners re-read the original POP-Q article (Bump *et al.* 1996). Most physiotherapist examiners viewed the AUGS POP-Q training DVD, one or more additional times during the course of the study. Each time the DVD was observed, there was an improvement in knowledge, confirming correct technique and improving understanding. For example, one physiotherapist on a repeat viewing realised that she had not been encouraging bearing down to complete the gh and pb measurements. As these points do not contribute to prolapse staging the study continued with that physiotherapist using the corrected technique.

Two 3-D models were developed (without external prompting) by two of the physiotherapists to assist with visualisation of the POP-Q points. One of the models used flexible garden wire to represent the vaginal profile, and moveable coloured beads for each POP-Q point (figure 2). The other model used a rigid plastic tube to represent the vagina, and flexible plastic sides and top (part of a rubber glove) were placed within the tube represented moveable vaginal walls. The operator moved the

flexible walls from above to illustrate where points, accessed from beneath, should be measured. These were developed and used by the physiotherapists with least experience in gynaecology to explain the POP-Q to colleagues. Peer discussion, although retrospective and limited by the constraints of the reliability study, was particularly helpful for the staff grade physiotherapists.

Place figure 2 here

Evaluation and feedback

The focus group was attended by one study gynaecologist and all six of the physiotherapist examiners. The predominant theme that emerged from the focus group, reported by all physiotherapist examiners and occurring throughout the discussion topics, related to confidence; the personal confidence of the physiotherapists to perform the POP-Q after training, and aspects that mediated that personal confidence with specific reference to ongoing feedback and learning.

The personal confidence of the examiners was mediated by their exposure to recent training. The two physiotherapists on 4 month training rotations expressed that learning new skills was a continual part of their professional lives, and therefore a familiar experience “*we have the advantage of ... trying to do new skills every 4 months ... so the POP-Q isn't really out of the ordinary*” (PTe). However, three of the four physiotherapists with long-standing experience in women's health, reported that they had reached stages in their careers where lack of confidence in a professional skill was an unfamiliar situation experienced as a loss of control “*... and it completely threw me because I never feel like that*” (PTc). In contrast, the gynaecologist examiner, with experience both in women's health and in performing the POP-Q,

demonstrated complete confidence in his ability to perform the POP-Q, acknowledging the difficult technical aspects of the examination without feeling any lack of personal confidence *“I’m confident of my uncertainty”* (G2). Two participants reported that levels of personal confidence were mediated by how frequently and how recently the skill had been performed *“I had a couple of clinics ... which were all quite close together ... and I took a lot of confidence from that”* (PTe).

All six physiotherapist examiners reported that levels of personal confidence were affected by feedback and informal discussion during the reliability study; this was a variable experience. Generally, the reliability study was felt to limit access to feedback and continued learning, leading to a lack of growth in personal confidence in performing the POP-Q *“I’m sure we’re all at that stage where we’re doing it and thinking ‘yeah’, but we’d like that reassurance”* (PTe). By contrast, those physiotherapist examiners who did receive informal feedback, or who participated in informal discussion during the study, associated this with an increase in personal confidence to perform the POP-Q *“I must be feeling it correctly because we’re the same, and I think I took a lot of confidence from that”* (PTe). It is clear that the artificial constraints on continued learning and practice imposed by the reliability study impacted on the capacity for continued learning, sometimes leading to frustration *“you would think, ‘oh I wish I could ask somebody about that’ ”* (PTa).

Despite repeated statements of a lack of personal confidence when performing the POP-Q, the physiotherapist examiners demonstrated considerable conceptual knowledge regarding the POP-Q during the focus group. There was sustained discussion throughout the focus group of concepts and issues relating to the POP-Q with the gynaecologist. Discussion topics included different models and methods to

explain fascial support to patients and the demonstration of the 3-d models developed during the study by the physiotherapist examiners to conceptualise the POP-Q.

Two participants stated that the duration of training was too short, although these comments were mediated by feelings of low personal confidence *“but I could have trained for 3 months and not have been sure”* (PTb). One participant (a staff grade physiotherapist) stated that there was additional learning associated with unfamiliar equipment, meaning that a longer training period would have been useful *“I was too busy getting the basic stuff and not even particularly the POP-Q stuff at that stage”* (PTf). There was informal lengthening of the training period during the reliability study including repeated viewing of the DVD and the creation of the 3-d models.

One physiotherapist examiner stated that the quality of the training was good, and two that it was variable. The variability reported referred specifically to the practical sessions, where learning took place under different medical staff who did not always perform the POP-Q in the same manner *“I was with different consultants and they all do it in a slightly different way ... which was good for our learning but ... that can be a bit confusing as well”* (PTb), and at clinics where there was not always the opportunity to see a range of POP, leading to unfamiliar presentations during the reliability study *“my problem was at clinics the only people that I saw had absolutely minimal prolapse”* (PTc). It was suggested that having a model for practice, where feedback on examination technique could be gained, would help with consistency.

There were some aspects of the training which the physiotherapist examiners found unfamiliar. One participant reported that the visualisation involved in performing the POP-Q (e.g. the cervix) was a less familiar way of working than using touch *“the fundamental difference for me, I think that as a physiotherapist we are*

used to feeling things and trusting our hands” (PTd). Another participant commented that much training in physiotherapy is facilitated by performing the procedure on a fellow trainee, allowing for a high level of feedback on technique, and that the training to undertake the POP-Q was not accompanied by usual levels of peer support and feedback.

Discussion

A POP-Q training programme was developed, consisting of a formal session with a verbal description of the POP-Q and watching the AUGS POP-Q training DVD, followed by clinical observation and supervised performance. Six physiotherapists with a wide range of experience were successfully trained to use the POP-Q system, including two with no prior experience in examining the pelvic floor muscles via internal examination.

The focus group discussions indicated that conceptual understanding of the POP-Q system was achieved by all physiotherapists. The use of the AUGS POP-Q training DVD and the development of 3-D models were important teaching aids in this learning process. Repeated viewing of the training DVD led to improved understanding, such as realising that the gh and pb measurements should be undertaken when the woman was bearing down. Similar misunderstandings have been reported elsewhere (Ali-Ross *et al.* 2009). The process of creating a model in 3-D and explaining it to others helped participants to develop an in-depth understanding of the methodology of the POP-Q, reinforced by demonstrating the models to other study participants and colleagues. Conceptual understanding of the POP-Q was also demonstrated during the focus group, when all of the physiotherapist examiners took part in extensive, technical discussion with the gynaecologist.

The models created by the physiotherapists to enhance their learning and understanding of the POP-Q, held common elements. In both cases there was a flexible element which could be shaped to a range of vaginal profiles, and a fixed element representing the hymen. In addition, there were items representing the POP-Q points (at least Aa, Ap) allowing the prolapse to be visualised by the movement of these points. These elements are also found in the 3-d teaching tool developed by Geiss *et al.* (2007), which had not been published when this study was conducted. The inclusion of these common elements in independently produced models indicates a shared need to conceptualise the POP-Q, and it is perhaps the interaction between the model and the trainee that helps to cement the concepts behind the POP-Q. The visualisation of the POP-Q as analogous to a house (Scotti *et al.* 2000; Flora 2014), may operate in a similar way, underscoring the need to transfer unfamiliar concepts into a familiar framework. However, the lack of a physical model that can be manipulated limits interaction to that which can already be conceptualised.

In the clinical situation it is accepted that one can ask more experienced colleagues for assistance with an unfamiliar clinical presentation or the learning of a new skill. This is a very important part of the ongoing learning process for a new skill (Steele *et al.* 1998) and one which was limited in this study, due to constraints of the reliability study. The physiotherapist examiners were able to perform the POP-Q examinations, but did not express complete personal confidence in their ability. This perhaps demonstrates that the mastery described by Wells (Steele *et al.* 1998) had not been reached through clinical practice. Practical training, in terms of the exposure to cases, was not consistent across clinics, and it was suggested that volunteers with known ranges of type and severity of prolapse could facilitate consistent training.

There are five main recommendations for the future composition of a training package which can be drawn from this experience. Firstly, sufficient time before POP-Q training commences to allow trainees to gain familiarity with vaginal examination and the equipment should be provided. Secondly, while the formal training session provided for this study was adequate, the addition of 3-d models with which the trainees can interact is likely to improve conceptualisation of the POP-Q prior to clinical experience. Thirdly, clinical practice is crucial to the confident performance of the POP-Q, and there is a need to ensure that clinical training encompasses a range of POP presentations, whether by attendance at clinics where a range of women with prolapse are evaluated, or by use of volunteers with particular presentations of prolapse. Fourthly, there should be sufficient clinical support in the early stages of performing the POP-Q, to allow for discussion and additional learning from peers and clinically experienced colleagues. Finally, we recommend continued learning after the POP-Q has started to be used. Repeated viewings of the AUGS DVD by physiotherapist examiners were accompanied by increased knowledge. This may also help to counteract a reduction in knowledge over time, such as that experienced by medical students five months after their initial instruction (Peterson & Amin 2014).

A limitation of this study was that evaluation of the training package was not the primary aim of the reliability study. Although set up with mechanisms to allow the review of the training process, the reliability study occasionally constrained the ability to evaluate training, most noticeably in limiting clinical training and discussion. Only a small number of physiotherapists who were committed to the research process were trained. It is not clear if the training package could be effectively rolled out to a larger and potentially less motivated group of clinicians.

The POP-Q is perceived as a difficult outcome measure to use and learn, yet there is a pressing need for a common outcome measure to allow effective interdisciplinary communication on the severity and progression of POP for both clinical and research purposes. In response to perceived difficulty in training and limited clinical use of the POP-Q, a simplified version has been developed (Parekh *et al.* 2011), but debate exists regarding whether it adequately covers all the information required from a prolapse examination (Bump 2014). Additionally, little attention has been given to the training required for the simplified version. Whichever version of the POP-Q becomes standard in future, there is a need for additional large scale research into the content and effectiveness of a standardised training programme to take trainees from first principles to clinical mastery of the POP-Q.

Conclusion

A training package consisting of a formal training session and three or four clinical training sessions was successful in training six physiotherapists to use the POP-Q with a good level of conceptual understanding. This was assisted by self-development of 3-d models, which should be incorporated within future training packages. Confidence in performing the POP-Q was restricted by the limited opportunities for clinical practice and discussion with colleagues, and methods of extending this practice should be considered in future training packages

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Biographical notes on the authors

Philippa M Dall is a senior research fellow with a background in physics and engineering. Her current research interest is focused on the objective measurement of physical activity and sedentary behaviour in a free-living environment.

Diane Stark is a Specialist Pelvic Floor Physiotherapist in Leicester, and a member of the Pelvic Obstetric and Gynaecology Physiotherapy professional network. Her clinical interests are management of pelvic floor dysfunction including symptoms of urinary incontinence, overactive bladder symptoms, faecal incontinence and obstructed defaecation and pelvic organ prolapse.

Suzanne Hagen is a Professor of health services research with experience in systematic reviewing, trials and outcome measure development, particularly in

relation to the interventions provided by nurses and allied health professionals. She has a long-standing interest in the conservative management of pelvic floor disorders such as incontinence and pelvic organ prolapse.

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Figure Legends

Figure 1: The POP-Q recording chart developed for this study, listing the nine site-specific measurement points of the POP-Q in the order they are measured, and with space to draw the vaginal profile.

Figure 2: One of the 3-d models developed during the training. The garden wire represents the vaginal wall, and can be bent into different profiles. The beads represent the internal site-specific points Aa, Ba, Ap, Bp, C and D.

Table 1: Professional designation and experience of POP-Q examiners

Grade	No.	Time working in Obs & gyn	Gynaecology clinics attended for practical training
Staff grade PT	2	4 months	4; 4
Senior PT in WH	2	6 years; 8 years	3; 3
Clinical specialist in PFD	1	16 years	3
Superintendent physiotherapist	1	14 years	4
Gynaecologist	2	15 years; 16 years	--

PT: physiotherapist; WH: women's health; PFD: *pelvic floor dysfunction*; Obs &

Gyn: Obstetrics and Gynaecology.

Figure 1

POP-Q Recording Form

POP-Q point	Description	Meas (cm)
gh	genital hiatus:middle external urethral meatus to post. midline of hymen	
pb	perineal body:posterior margin of genital meatus to mid-anal opening	
Aa	midline anterior vaginal wall 3cm proximal to externalurethral meatus	
Ba	distal position of remainder of upper anterior vaginal wall	
C	distal edge cervix/vaginal cuff scar	
D	posterior fornix (if cervix present)	
Ap	midline posterior vaginal wall 3cm proximal to the hymen	
Bp	distal portion of remainder of posterior vaginal wall	
TVL	depth of vagina when point C or D is reduced to normal position	

POP-Q Graph

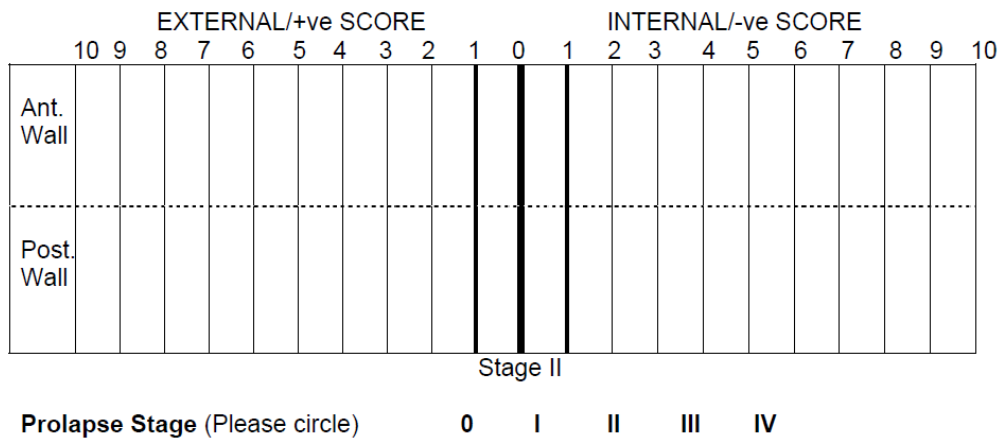


Figure 2

